	Type	L #	Hits	Search Text	DBs	Time Stamp	Comments	Error Definition
1	BRS	L1	49	("4619841" "6067509" "4758353" "5254468" "5397700" "6319312" "6340388" "5239456" "6249712" "5757498" "4555437" "5178422" "5650213" "6078182" "4261970" "6067784" "4775427" "4377129" "4472246" "4492615" "4543163" "4849264" "5192610" "5496585" "6214424" "6214424" "4548579" "6045061" "6200734" "6297038" "6473480" "4256547"	USPAT	2003/05/02 13:40		
2	BRS	L2	37	l1 and (thickness or width or depth)	USPAT	2003/05/02 13:42		
3	BRS	L3	35	l2 and (range)	USPAT	2003/05/02 13:43		
4	BRS	L4	4	l3 and (variation near4 (film or wafer or substrate))	USPAT	2003/05/02 14:03		

	Type	L #	Hits	Search Text	DBs	Time Stamp	Comments	Error Definition
5	BRS	L5	35	l3 and (industry standard)	USPAT	2003/05/02 14:04		
6	BRS	L6	0	l5 and (world near2 standard)	USPAT	2003/05/02 14:05		
7	BRS	L7	1	l5 and (statistical near2 analysis)	USPAT	2003/05/02 14:12		
8	BRS	L8	1	l7 and (painting adj booth)	USPAT	2003/05/02 14:13		
9	BRS	L9	1	l8 and (color adj group)	USPAT	2003/05/02 14:13		
10	BRS	L10	1	l9 and (time adj frame)	USPAT	2003/05/02 14:15		
11	BRS	L11	0	l10 and (change near3 cost)	USPAT	2003/05/02 14:18		'
12	BRS	L12	0	l2 and (statistical adj index)	USPAT	2003/05/02 14:20		
13	BRS	L13	1	l2 and (coating near4 cost)	USPAT	2003/05/02 14:56		
14	IS&R	L14	1	("6150023").PN.	USPAT	2003/05/02 14:56		

LEVEL 1
AN   184372615 INPADOC   ED 20021002   EW 200239   UP 20030401   UW 200313
TI   FILM THICHNESS MEASURING MONITOR WAFER
IN   EBATA, MAKOTO; FUJITA, FUSAO; SAITO, MAKOTO
INS   EBATA MAKOTO; FUJITA FUSAO; SAITO MAKOTO
INA   JP; JP; JP
PA   MITSUI ENGINEERING & SHIPBUILDING CO., LTD.; ADMAP INC.; EBATA, MAKOTO;
        FUJITA, FUSAO; SAITO, MAKOTO
PAS   MITSUI SHIPBUILDING ENG; ADMAP INC; EBATA MAKOTO; FUJITA FUSAO; SAITO
        MAKOTO
PAA   JP; JP; JP; JP; JP
TL   English; French
LA   Japanese
DT   Patent
PIT   WOA1 PUBL.OF THE INT.APPL. WITH INT.SEARCH REPORT
FDT   with international search report
PI   **WO 2002071473   A1 20020912**
DS   RW: DE FR GB NL
        W: CN KR US
AI   WO 2002-JP1956   A 20020304
PRAI   JP 2001-60367   A 20010305
        JP 2002-31015   A 20020207
AIT   WOA patent application
PRAIT   JPA patent application
ICM   (7) H01L021-66
EPC   H01L21/66M2
AB   A wafer having a structure of enabling an SiC wafer to be put to
        practical use as a wafer for monitoring a film thickness. The average
        surface roughness Ra of at least one surface of an SiC wafer is set to be
        almost equivalent to the thickness of a film to be formed on an SiC wafer
        to be measured. It is set to be less than an upper limit value which is
        determined as a minimum film thickness of several types, if available, of
        films formed on the SiC wafer to be measured. More specifically, it is
        set to be about 400 times the average surface roughness of a product Si
        wafer, that is, Ra is preferably set to be up to 0.008 mu m.
        Accordingly, a hard and chemically resistant film thickness measuring
        wafer can be practically used, even if not polished to the level of the
        product Si wafer, as a film-thickness-monitoring wafer, thereby providing
        a film-thickness-measuring monitor wafer that can be reduced in polishing
        cost and used semi-permanently.

LEGAL STATUS
AN   184372615 INPADOC   UPLS 20021112
20010305 WOAA A   PRIORITY (PATENT)
                     JP 2001-60367   A 20010305
                    20021002
20020207 WOAA A   PRIORITY (PATENT)
                     JP 2002-31015   A 20020207
                    20021002
20020304 WOAE A   APPLICATION DATA
                     WO 2002-JP1956   A 20020304
                    20021002
20020912 WOAK A1 + DESIGNATED STATES CITED IN A PUBLISHED APPLICATION WITH
                     SEARCH REPORT
                     CN KR US
                    20021002
20020912 WOAL A1 + DESIGNATED COUNTRIES FOR REGIONAL PATENTS CITED IN A
                     PUBLISHED APPLICATION WITH SEARCH REPORT
                     DE FR GB NL
                    20021002

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20020912 WOA1    + PUBLICATION OF THE INTERNATIONAL APPLICATION WITH THE
                   INTERNATIONAL SEARCH REPORT
                   .........................................20021002
20021106 WO121     EP: THE EPO HAS BEEN INFORMED BY WIPO THAT EP WAS
                   DESIGNATED IN THIS APPLICATION
                   .........................................20021112
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Set       Items    Description
S1       7829416   MONITOR? OR OBSERV? OR EXAMIN? OR CHECK? OR SUPERVIS?
S2       4025364   VARIATION OR VARYING OR VARY OR VARIES OR DIFFERENC?
S3       4012981   FILM? OR COAT? ? OR COATING? ? OR COATED
S4       2557884   THICKNESS? OR WIDTH OR BREADTH OR DEPTH
S5       2185721   WORK()PIECE? OR WORKPIECE? OR WAFER? OR SUBSTRATE?
S6      17694711   MEASUR? OR CALCULAT? OR COMPUT? OR DETERMIN? OR EVALUAT?
S7       3254609   COST? OR BILL OR BILLS OR BILLING? OR PAYMENT?  OR FEE OR -
                   FEES OR PAY? ? OR PAYING OR PRIC????
S8         14523   S1 AND S2 AND S3 AND S4
S9          3027   S1(10N)S2(10N)S3(10N)S4
S10       839402   S6 AND S7
S11       269993   S6(10N)S7
S12       190489   S6(5N)S7
S13            2   S9 AND S5 AND S12
S14           34   S10 AND S5 AND S8
S15           31   RD (unique items)
S16           29   S15 NOT S13
S17         1262   S1(3N)S3(3N)S4(3N)S5
S18           14   S17 AND COST?
S19           12   RD (unique items)
S20           11   S19 NOT S16
?  show files
File 315:ChemEng & Biotec Abs 1970-2003/Mar
         (c) 2003 DECHEMA
File   2:INSPEC 1969-2003/Apr W2
         (c) 2003 Institution of Electrical Engineers
File   6:NTIS 1964-2003/Apr W4
         (c) 2003 NTIS, Intl Cpyrght All Rights Res
File   8:Ei Compendex(R) 1970-2003/Apr W2
         (c) 2003 Elsevier Eng.  Info. Inc.
File  34:SciSearch(R) Cited Ref Sci 1990-2003/Apr W3
         (c) 2003 Inst for Sci Info
File 434:SciSearch(R) Cited Ref Sci 1974-1989/Dec
         (c) 1998 Inst for Sci Info
File  99:Wilson Appl. Sci & Tech Abs 1983-2003/Mar
         (c) 2003 The HW Wilson Co.
File  94:JICST-EPlus 1985-2003/Apr W3
         (c)2003 Japan Science and Tech Corp(JST)
File  65:Inside Conferences 1993-2003/Apr W3
         (c) 2003 BLDSC all rts. reserv.
File  35:Dissertation Abs Online 1861-2003/Mar
         (c) 2003 ProQuest Info&Learning
File 583:Gale Group Globalbase(TM) 1986-2002/Dec 13
         (c) 2002 The Gale Group
File 474:New York Times Abs 1969-2003/Apr 24
         (c) 2003 The New York Times
File 475:Wall Street Journal Abs 1973-2003/Apr 24
         (c) 2003 The New York Times
File 347:JAPIO Oct 1976-2002/Dec(Updated 030402)
         (c) 2003 JPO & JAPIO
File 350:Derwent WPIX 1963-2003/UD,UM &UP=200324
         (c) 2003  Thomson Derwent
?
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16/9/9   (Item 2 from file: 6)
DIALOG(R)File   6:NTIS
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0834322 NTIS Accession Number: DOE/JPL/954896-1/XAB
 Vitre-Graf Coating on Mullite. Low Cost Silican Solar Array Project:
Large Area Silicon Sheet Task. Final Report, December 14, 1977-June 13,
1979
  Rossi, R. C.
 Tylan Corp., Torrance, CA.
  Corp. Source Codes: 9509687
  Sponsor: Department of Energy, Washington, DC.
  1979   83p
  Languages: English
  Journal Announcement: GRAI8020; NSA0500
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email at orders@ntis.fedworld.gov. NTIS is located at 5285 Port Royal Road,
Springfield, VA, 22161, USA.
  NTIS Prices: PC A05/MF A01
  Country of Publication: United States
  Contract No.: NAS-7-100-954896

  A   technical   and   economic   **evaluation**   was   made   of   a   proprietary
glass-like carbon glaze **coating** applied to mullite and graphite to be
used   either   in   thin- **film**   silicon manufacture   or   in container ware
applications. Preliminary **evaluations**   had   indicated   that   the   glassy
carbon **coating** reacts with molten silicon to form a silicon carbide
reaction layer that may serve as a diffusion barrier to prevent silicon
reaction with the **substrate** material. The technical evalution consisted
of manufacturing test samples by **varying** materials and processing
parameters in conformance with a pre-selected matrix. Various tests,
primarily **coating** appearance, adherence and silicon reaction behavior was
 observed as a function of the test parameter **variation** . The results of
these tests indicated that most graphite and carbonaceous materials used as
 substrates will produce a visually acceptable **coating** having excellent
adherence over a wide range of processing parameters. However, no set of
parameters produced a **coating** that could withstand the chemical attack
from molten silicon and prevent reaction with a graphite **substrate** . The
primary consideration of graphite **substrates** was in container ware
applications requiring long-time molten silicon exposure. The conclusion of
this study suggested that the glassy carbon **coating** might provide
protection for time periods of 30 minutes or less, and therefore was not
suitable for the intended application. The economic analysis generated a
process based on the selected parameters for **coating** glassy carbon onto
newly developed mullite **substrate** material. By using the interim standard
 price estimating equation a projected **cost** of $1.30/m exp 2 was
 calculated based on 1975 dollars. (ERA citation 05:021982)
  Descriptors: Graphite; *Mullite; *Silicon; Adhesion; Carbon; **Coatings** ;
Crucibles; Dip **coating** ; Dipped **coatings** ; Economics; Etching; **Films** ;
Impurities; Ion microprobe analysis; Manufacturing; Paints; Porosity;
Quantitative chemical analysis; Resins; Sample preparation; Scanning
electron microscopy; Silicon carbides; Silicon solar cells; **Substrates** ;
 Thickness
 .Identifiers: ERDA/140501; ERDA/360601; NTISDE
  Section   Headings: 97N   (Energy--Solar   Energy);   71E   (Materials
Sciences--Coatings, Colorants, and Finishes)

01873744   ORDER NO: AADAA-I3042976
Synthesis and characterization of sol-gel-derived nanomaterials and nanocrystalline electroless metal coatings

   Author: Shukla, Satyajit Vishnu
   Degree: Ph.D.
   Year: 2002
   Corporate Source/Institution: University of Central Florida (0705)
   Adviser: Sudipta Seal
   Source: VOLUME 63/02-B OF DISSERTATION ABSTRACTS INTERNATIONAL.
        PAGE 976. 270 PAGES
   Descriptors: ENGINEERING, MATERIALS SCIENCE
   Descriptor Codes: 0794
   ISBN: 0-493-56850-6

    CuS (minimum size of 2.5 nm), Ag_2S (minimum and average size of 2.5 nm and 26 nm respectively), and Au (with minimum size of <10 nm) nanoparticles dispersed within the sol-gel derived hydroxypropyl cellulose (HPC)-silica **films** are synthesized using the gas diffusion technique. The effectiveness of HPC polymer, as a 'compatibilizer', to synthesize semiconductor and metal nanoparticles distributed uniformly within the silica **film** is demonstrated. The sol-gel derived HPC-silica **films** containing dispersed nanoparticles are characterized using x-ray photoelectron spectroscopy (XPS) to understand the mechanism of formation of nanoparticles within the **film** . The XPS core-level binding energies (B.E.) for the nanoparticles are **observed** to be sensitive to the **variation** in the chemical composition at the surface and their size. The 'cluster size effect' is shown to be useful in predicting the average nanoparticle size.

    Nanocrystalline ZrO_2 particles are successfully synthesized using sol-gel technique utilizing HPC polymer as a 'steric barrier'. The use of HPC polymer is demonstrated to synthesize submicron-sized, non-agglomerated, and spherical as well as nanocrystalline ZrO_2 particles by adjusting the sol-gel synthesis parameters. The effect of sol-gel synthesis parameters on ZrO_2 nanocrystallite size, its distribution, and the phase evolution behavior of ZrO_2 is studied. The optimum sol-gel synthesis parameters for synthesizing nanocrystalline ZrO_2 with 100% tetragonal phase are identified.

    Cu/CuO-ZrO_2 composite powder is synthesized using the electroless metal deposition technique. The mechanism of electroless deposition of Cu over ZrO_2 particle surface is investigated using XPS. On the basis of 'cluster size effect', it is suggested that, the electroless metal deposition process activates the non-catalytic ceramic **substrate** surface by depositing metallic Pd^0 clusters and not by the accepted Pd-Sn alloy catalyst. Fly ash cenosphere particle surface is also activated by metallic Pd^0 clusters under similar **coating** conditions. The cenosphere particles are further **coated** with Ag using Pd-activation. The Cu and Ag- **coated** cenosphere particles find application in manufacturing conducting polymers used for electromagnetic interference (EMI) shielding application. The use of **cost** -effective activator ($AgNO_3$) is demonstrated for **coating** the cenosphere particles with Cu for commercialization. The use of Focussed Ion Beam (FIB) microscopy technique is demonstrated to directly **measure** the **coating** - **thickness** .

03443894   INSPEC Abstract Number: A89102816, C89054330
 Title: **Low cost self ON-OFF auto run vacuum coating system**
   Author(s): Vora, H.S.; Kumbhare, M.N.; Bemalkhedkar, M.M.
   Author Affiliation: Nucl. Res. Lab., Bhabha Atomic Res. Centre, Srinagar,
India
   Journal: IETE Technical Review   vol.5, no.11   p.447-50
   Publication Date: Nov. 1988 Country of Publication: India
   CODEN: ITREEI ISSN: 0256-4602
   Language: English   Document Type: Journal Paper (JP)
   Treatment: Practical (P)
   Abstract: Control circuits for self ON-OFF and sequential operations in a
vacuum coating unit, have been designed and tested. The circuits are
general in nature and can be easily incorporated in any coating unit. A
crystal clock times the self starting, putting the auto vacuum **coating**
 system, ON. The **thickness** of the material **coated** on the **substrate** is
sensed by a crystal **thickness** **monitor** for terminating the process after
the preset thickness is reached. This is done by stopping power to
filament/boat and covering it by a vane rotated by a stepper motor. The
vacuum system is then sequentially put OFF. (1 Refs)
   Subfile: A C
   Descriptors: physical instrumentation control; vacuum deposited coatings;
vacuum deposition
   Identifiers: physical instrumentation control; self ON-OFF auto run
vacuum coating system; sequential operations; crystal clock; substrate;
crystal thickness monitor; vane; stepper motor
   Class Codes: A8115G (Vacuum deposition); A0670T (Servo and control
devices); C3380D (Physical instruments)

DESCRIPTION OF DRAWING(S) - The figure shows a flowchart
representing anodizing system control process.
         pp; 21 DwgNo 6/9
Title Terms: ANODISE; SYSTEM; METALLIC; MATERIAL; COATING; AIRCRAFT;
   INDUSTRIAL; RECEIVE; REFLECT; REFRACT; RADIATE; SUBSTRATE; COATING; BASED
   ; COATING; THICK; DETERMINE
Derwent Class: M11; P73; V07; X25
International Patent Class (Main): B32B-009/00
International Patent Class (Additional): C25B-009/00; C25C-007/00;
   C25D-009/00; C25D-017/00
File Segment: CPI; EPI; EngPI
Manual Codes (CPI/A-N): M11-E; M11-J02
Manual Codes (EPI/S-X): V07-F02A; X25-K05

   20/9/9   - (Item 2 from file: 350)
DIALOG(R)File 350:Derwent WPIX
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014862216   **Image available**
WPI Acc No: 2002-682922/200273
XRAM Acc No: C02-192754
XRPX Acc No: N02-539146
   Film   thickness **measuring** monitor   wafer **with reduced polishing**
   costs **and good chemical resistance**
Patent Assignee: ADMAP KK (ADMA-N); MITSUI ENG & SHIPBUILDING CO LTD (MITB
   ); ADMAP INC (ADMA-N)
Inventor: EBATA M; FUJITA F; SAITO M
Number of Countries: 008 Number of Patents: 002
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
WO 200271473	A1	20020912	WO 2002JP1956	A	20020304	200273	B
JP 2002334911	A	20021122	JP 200231015	A	20020207	200307	

Priority Applications (No Type Date): JP 200231015 A 20020207; JP 200160367
   A 20010305
Patent Details:

Patent No	Kind Lan Pg	Main IPC	Filing Notes
WO 200271473	A1 J 19	H01L-021/66	

   Designated States (National): CN KR US
   Designated States (Regional): DE FR GB NL

JP 2002334911 A		7 H01L-021/66	

Abstract (Basic): WO 200271473 A1
      NOVELTY - A **wafer** has a structure enabling a silicon carbide
   (SiC) **wafer** to **monitor   film   thickness** . The average surface
   roughness Ra of one surface of an SiC wafer is set to the thickness of
   a film to be formed on an SiC wafer, less than an upper limit value
   determined as a minimum thickness of several types of films. More
   specifically, it is set too be about 400 times the average surface
   roughness of a product Si wafer, 0.008 microns.
      USE - **Film   thickness** measuring **monitor   wafer** .
      ADVANTAGE - The wafer has reduced polishing **costs** and can be used
   semi-permanently. The wafer is hard and chemically resistant.
         pp; 19 DwgNo 2/7
Title Terms: FILM; THICK; MEASURE; MONITOR; WAFER; REDUCE; POLISH; **COST** ;
   CHEMICAL; RESISTANCE
Derwent Class: L03; S02; U11
International Patent Class (Main): H01L-021/66
File Segment: CPI; EPI
Manual Codes (CPI/A-N): L04-C18

Manual Codes (EPI/S-X): S02-A08A; U11-F01B5

 20/9/10   (Item 3 from file: 350)
DIALOG(R)File 350:Derwent WPIX
(c) 2003 Thomson Derwent. All rts. reserv.

014538233   **Image available**
WPI Acc No: 2002-358936/200239
  Method for forming semiconductor test wafer
Patent Assignee: SAMSUNG ELECTRONICS CO LTD (SMSU)
Inventor: LEE S M
Number of Countries: 001 Number of Patents: 001
Patent Family:
Patent No   Kind   Date   Applicat No   Kind   Date   Week
KR 2001107140 A   20011207 KR 200028384   A   20000525 200239 B

Priority Applications (No Type Date): KR 200028384 A 20000525
Patent Details:
Patent No Kind Lan Pg   Main IPC   Filing Notes
KR 2001107140 A   1 H01L-021/66

Abstract (Basic): KR 2001107140 A
        NOVELTY - A test wafer formation method is provided to reduce a
    wastage of wafers and to reduce **costs** by mounting a test chip on a
    groove of a mother wafer.
        DETAILED DESCRIPTION - A desired thin **film** is deposited on a
    wafer for **monitoring** . The thin **film** is then patterned. The
    thickness of the **monitoring** **wafer** is reduced by polishing the back
    side of the monitoring wafer. The polished wafer is then cut in order
    to form a unit test chip(20) and cleaned. A mother wafer(22) having at
    least one groove is prepared. The test chip(20) is mounted on the
    groove of the mother wafer(22). The polishing is a CMP(Chemical
    Mechanical Polishing).
        pp; 1 DwgNo 1/10
Title Terms: METHOD; FORMING; SEMICONDUCTOR; TEST; WAFER
Derwent Class: U11
International Patent Class (Main): H01L-021/66
File Segment: EPI
Manual Codes (EPI/S-X): U11-F01

 20/9/11   (Item 4 from file: 350)
DIALOG(R)File 350:Derwent WPIX
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008307437   **Image available**
WPI Acc No: 1990-194438/199026
XRAM Acc No: C90-084085
XRPX Acc No: N90-151305
  Monitoring ion supported techniques used on wafers in process chamber -
  includes determining energy of ions and/or ion beam divergence
Patent Assignee: FRAUNHOFER-GES FORD ANGE (FRAU); FRAUNHOFER GES
   FOERDERUNG (FRAU); FRAUNHOFER GES FOERDERUNG ANGEWANDTEN (FRAU)
Inventor: HEINRICH F; FRIEDHELM H
Number of Countries: 015 Number of Patents: 009
Patent Family:
Patent No   Kind   Date   Applicat No   Kind   Date   Week
DE 3910491   C   19900628 DE 3910491   A   19890331 199026 B
WO 9012415   A   19901018   199044

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Set       Items    Description
S1      5183497    MONITOR? OR OBSERV? OR EXAMIN? OR CHECK? OR SUPERVIS?
S2      2206669    VARIATION OR VARYING OR VARY OR VARIES OR DIFFERENC?
S3      1446988    FILM? OR COAT? ? OR COATING? ? OR COATED
S4      1131163    THICKNESS? OR WIDTH OR BREADTH OR DEPTH
S5       467950    WORK()PIECE? OR WORKPIECE? OR WAFER? OR SUBSTRATE?
S6     11388659    MEASUR? OR CALCULAT? OR COMPUT? OR DETERMIN? OR EVALUAT? OR
                   ANALY?
S7     11958742    COST? OR BILL OR BILLS OR BILLING? OR PAYMENT?  OR FEE OR -
                   FEES OR PAY? ? OR PAYING OR PRIC????
S8         2176    S1(S)S2(S)S3(S)S4
S9      2245438    S6(S)S7
S10          49    S8(S)S9(S)S5
S11          48    RD (unique items)
S12         931    S1(6N)S3(6N)S4(6N)S5
S13         317    S1(3N)S3(3N)S4(3N)S5
S14           8    S13(10N)COST?
S15           4    RD (unique items)
S16      290280    S6(3N)COST?
S17       75706    S3(3N)S4
S18          57    S16(S)S17
S19          21    S16(10N)S17
S20          16    RD (unique items)
S21          16    S20 NOT S15
?   show files
File  16:Gale Group PROMT(R) 1990-2003/Apr 24
         (c) 2003 The Gale Group
File 148:Gale Group Trade & Industry DB 1976-2003/Apr 24
         (c)2003 The Gale Group
File 621:Gale Group New Prod.Annou.(R) 1985-2003/Apr 24
         (c) 2003 The Gale Group
File 275:Gale Group Computer DB(TM) 1983-2003/Apr 24
         (c) 2003 The Gale Group
File  15:ABI/Inform(R) 1971-2003/Apr 25
         (c) 2003 ProQuest Info&Learning
File   9:Business & Industry(R) Jul/1994-2003/Apr 24
         (c) 2003 Resp. DB Svcs.
File 349:PCT FULLTEXT 1979-2002/UB=20030417,UT=20030410
         (c) 2003 WIPO/Univentio
File 348:EUROPEAN PATENTS 1978-2003/Apr W03
         (c) 2003 European Patent Office
?
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09772131   Supplier Number: 85898089 (THIS IS THE FULLTEXT)
**Tevet Closes a Strategic Investment, Expands Its Operation and Positions
Company for Growth.**
Business Wire, p0376
May 13, 2002
Language: English   Record Type: Fulltext
Document Type: Newswire; Trade
Word Count: 539
TEXT:
 Business Editors and High Tech Writers
     YOKNEA'M, Israel--(BUSINESS WIRE)--May 13, 2002
      Industry veteran Yuval Wasserman named as US-based President of
      the semiconductor metrology company
      Tevet Process Control Technologies, a start up company in the area
of advanced metrology solutions for the semiconductor industry, today
announced the completion of a strategic investment round and the hiring of
Yuval Wasserman as the company's President.
      The investment round was lead by West-Steag Partners GmbH and also
included Deacom Investments Ltd. as well as Tevet's current investors.
      "This investment, at this time of industry downturn, is a vote of
confidence in the company and its technology and is attributed to the
unique nature of Tevet's products," said Ofer Du-Nour, Tevet's founder and
Chairman. "It will allow Tevet to expand its operation and restructure for
growth."
      "Our plan is to use the investment to increase our marketing and
product development capabilities including the initial stage of building a
worldwide distribution infrastructure, taking full advantage of recent
successes. In addition, we seek to leverage the developing recovery in our
industry while continuing our innovation through critical integrated and
in-situ measurement applications development," commented Du-Nour.
      During the last year Tevet focused its efforts on demonstrating and
enhancing its integrated metrology solutions in beta sites at leading
semiconductor manufacturing companies and processing equipment companies.
      Installed in these beta sites, Tevet's IsTMS product has
demonstrated its **cost** -saving capabilities in **measuring   film
thickness** while integrated with commercial single wafer CVD processing
tools in production environments.
      "I am also pleased to announce that Yuval Wasserman has joined Tevet
as the company's President," added Du-Nour. "Yuval's experience, coupled
with a broad knowledge of the industry and related technologies will
provide strong leadership and business savvy, helping Tevet to accelerate
the company's initial growth phase".
      A twenty-year industry veteran, Yuval Wasserman has a diverse
experience in semiconductor processing technology and in semiconductor
equipment manufacturing. Prior to joining Tevet, Wasserman was a senior
vice president for sales and marketing at Boxer Cross Inc. Prior to that he
was the General Manager of Fusion Semiconductor, a division of Eaton
Semiconductors (Axcelis) and held executive and managerial positions at AG
Associates and National Semiconductor.
      "I am excited about Tevet and its products," said Wasserman.
"Tevet's integrated metrology solutions are attractive in terms of their
performance, economy and return on investment. The company and its products
are well positioned to capture the increasing demand for integrated
metrology solutions and automatic process control in the market."
      About Tevet-PCT: Founded in 1999, Tevet develops innovative
metrology and advanced process control solutions for the semiconductor
processing industry. Tevet's metrology relies on proprietary broadband

reflectometry as the basis for its integrated and in-situ measurement
solutions. Tevet products are uniquely capable of performing simultaneous
film thickness measurements, on multiple topographies and stacks, on
product wafers and with seamless integration with the wafer processing
equipment. In July 2001 Tevet launched its IsTMS integrated metrology
module for CVD applications.
        Note: digital photo of Mr. Wasserman is available upon request.
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08805946   Supplier Number: 76573107 (THIS IS THE FULLTEXT)
**Tevet Introduces a New In-Situ Metrology System to Measure Semiconductor
  Film Thickness.**
Business Wire, p2142
July 17, 2001
Language: English   Record Type: Fulltext
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TEXT:
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      YOKNEA'M, Israel--(BUSINESS WIRE)--July 17, 2001
        ISTMS Addresses Industry Need for Advanced Integrated and In-Situ
Metrology Solutions; Yield, Throughput and Uptime Can All be Enhanced
        Tevet Process Control Technology , a start up company in the area of
advanced metrology solutions for the semiconductor industry, today
announced the introduction of its ISTMS -- In-Situ Thickness Measurement
System, after completion of beta testing in multiple customer sites.
        Installed in beta sites just one year ago, the ISTMS has
demonstrated its **cost** -saving capabilities in **measuring   film
thickness** while integrated with commercial single wafer CVD processing
tools in a production fab.
        The ability to measure critical parameters during the manufacturing
process could prevent much of the wafer-to-wafer and device-to-device
variation in finished products, and speeds the correction time of process
excursions.
        Tevet's thickness decomposition method(TM) was specifically
developed to address the special requirements needed for advanced process
control using in-situ or integrated metrology. Tevet's solution relies on
rapid, broad spectral analysis using multiple optical sensors positioned
above the processed wafer. Multi-point measurements are performed
simultaneously.
        Integrated measurement modules are integrated with the process tool,
within the footprint of the process tool, but outside the process chamber.
In addition to the hardware integration, the measurement data is used
directly by the process tool to adjust its control parameters on a
wafer-by-wafer basis.
        In-Situ measurement systems are also integrated in the process tool,
but are measuring while the wafer is being processed. The process may be
interrupted to make a measurement, then completed based on the measurement
feedback, or process and measurements can be performed in parallel. Using
in-situ measurements, a fab could theoretically be free of mis-processed
wafers because real-time corrections could be made on each wafer.
        Examples of what the ISTMS can measure include: multiple films
stacked on the product wafer, thickness on top of complicated patterns,

dense structures without the need for pattern recognition or vision, and measurement on moving (or spinning) wafers. Films measured would include oxide, nitride, poly, barrier metals, STI trench, photoresists and SOD (spin-on dielectrics).

"ISTMS entails a new approach for performing integrated and in-situ measurements," said Ofer Du-Nour, president and director of technology of Tevet. "Unlike traditional integrated metrology solutions that rely mainly on re-packaging of existing, classical metrology solutions into a new modular package, Tevet is employing a new measurement scheme that relies on unique technology and algorithms that make it more suitable for in-situ or integrated measurements."

Tevet will market the ISTMS to both IC manufacturers and OEM processing equipment manufacturers that have a clear need for an Integrated Metrology solution as an independent option or as part of an APC (Advanced Process Control) scheme.

About Tevet pct: Founded in 1999, Tevet develops innovative metrology and advanced process control solutions for the semiconductor processing industry. Tevet's solutions rely on its unique measurement modules that are integrated into the processing equipment used for manufacturing of semiconductor devices.

PUBLISHER NAME: Business Wire
INDUSTRY NAMES: BUS   (Business, General); BUSN   (Any type of business)   .

TEXT:
    Cost Issues
    To measure and effectively control the cost of a coating operation, a manager must have knowledge of the issues that affect cost. There are a number of issues which establish the framework for a review of operating costs. Some of the key ones are as follows: Quality goals, The substrate and condition of the part. Part preparation and pre-treatment, Racking arrangement, Rework and scrap, Colour changes

    The desired or specified level of quality affects the entire process, from pretreatment to the application process, the amount of paint required, the amount of rejects expected, the amount of touch-up, the quality inspection procedure, and even the packaging used. All of these are important cost factors relating to the goals of quality. For instance, since we know that no finishing line can produce 100 per cent flawless product 100 per cent of the time, it makes sense to lower our expectation of quality and accept some blemishes on the back or unseen part of the product, but not on the critical areas. It would represent an unreasonable quality goal to declare a reject for a blemish on an uncritical surface and thus add to the cost for reworking that part.

    The substrate and the condition of the part is also a major factor in the cost of coating. Simple parts in high volume with light soils will not cost nearly as much per square foot as complex shapes in low volume with heavy grease or other soils that need to be removed prior to painting.

If cost on this job is originally calculated on the basis of the lighter soil and when the parts that arrive for painting are very different, the paint department's costs will escalate beyond budget. More process time, higher temperatures perhaps, higher cleaner concentrations, and more rejects will all add to the cost to properly finish this part.

Our third issue is racking. Paint racks are costly and universal racks may not be suitable in all cases. If a part requires special racking, this cost must he amortized over the expected number of parts to be painted. If the expected number of parts turn out to have been overestimated, then the cost per part will be higher. Furthermore, the key to throughput and application efficiency is rack density, i.e. the number of parts that can be loaded onto the line in a given time period. If apart, because of shape or size, cannot be loaded as densely as the normal parts on standard racks, that part will cost more than average to paint.

Rework is obviously a major cost factor and often a variable one. Some parts cannot be satisfactorily coated a second time and must be stripped. In some cases, parts cannot be stripped and cannot be recoated, meaning they have to be scrapped. Many parts may have to he sanded before recoating. There are a great deal of variable costs involved in rework, which were probably not in the original cost estimate.

The last major issue is colour change. Downtime for colour change is lost production time and lost revenue. If lost revenue, direct and indirect labour and the cost of cleaning materials are added into the piece cost of a run ofi 000 pieces, each part will have a cost of upwards of $0.05. If the run is 100 pieces, the extra cost due to colour change will be $0.45 per piece. Identifying this "set-up" cost associated with colour change may help management appreciate the cost of offering many colours in small volumes.

Measuring Cost

Measuring cost in the coating operation should focus on the cost per piece. Every part has its unique aspect, which affects its cost to finish. Some parts are easy to coat, some are harder to coat and result in more rejects. Some require more reinforcement. How accurately can the **film thickness** be controlled on a specific part?

To **calculate** the **cost** of finishing a particular part with a particular coating. use a standard cost accounting formula. It should include the following factors: Material cost, Labour, Plant overhead, Fixed cost, Rework cost.

How long is the run of this part? Are there any quality standards for this part that will increase its expected reject rate? Are there any special features that add to its cost such as two toning or threads?

Estimate the material cost by calculating the cost of the paint or powder per sq ft of coverage. For powder, priced per lb or kg, use 90 per cent utilization, mil thickness of 3 mil, specific gravity of 1.5. For liquid paint, priced per gal or L, use your estimated transfer efficiency times the theoretical coverage of 2 mils times the per cent solids. If you have historical data, use that instead of calculating. Calculate the sq ft area of the part as accurately as possible. Add in a factor for start-up waste and clean up. The material cost per piece will be the cost of covering a square foot with the powder or paint times the sq ft area of the part. Do not forget to add the cost of colour change per piece as described earlier.

For labour costs, add the wage costs for all personnel required to operate the system including, rackers, loaders, masking, blow-off, supervisors and inspectors. Calculate the cost per hour. Divide this number by the number of pieces that can be produced in an hour to arrive at the cost of labour per piece.

Plant overhead numbers as well as the fixed cost numbers should be available from your accounting office. Collect data for a monthly total and divide these numbers by the number of pieces you can produce in that time to arrive at a cost per piece.

Research the reject rate as a percentage of production in a week or use specific numbers for the actual part, if known. If this number is calculated to be 10 per cent of production, then multiply the total cost per piece by 110 per cent. Remember to adjust this number for the cost of scrapping some parts and replacing them, if this is a factor.

The sum of these calculations times the rework percentage should give you an estimated per piece cost. The significance of this number and the activity of calculating it will enable the paint shop manager to compare costs piece by piece or by historical time. It will also allow the paint shop manager to calculate overall paint system operation costs based on hypothetical production rates of specific parts. Many companies already have much of this data within the cost accounting system, but the data cannot be maintained accurately without the input of the paint shop manager.

Controlling costs

Uncontrolled variables make the measured or estimated cost totally unreliable for any budgetary or planning purposes. And worse, these invariably mean higher cost, not lower cost. Vigilance in the areas identified in the cost measurement analysis is necessary.

What factors add to material costs? Answer: too much film thickness, poor transfer efficiency, waste and colour changes.

Which factors increase labour costs? Answer: Increase in reject rate, colour change, unscheduled downtime, changes in process parameters.

Cost control requires management of the process to reduce the impact of these variables. If equipment such as guns, racks, ovens and washer nozzles is in poor condition, the throughput and quality of the system will suffer, resulting in higher cost. Understaffing results in inefficiencies and mistakes. Efficient management means selecting the right equipment, maintaining the equipment on a timely basis, establishment of performance in parts produced, per cent rejects and film build control. Use the developed measurements to create and manage process controls. Develop a well-trained group of workers, with adequate staffing as needed.

Chart III: Cost Per Square Foot for Electrocoat

Variables: Ratio of Resin to Paste, Volume of Solids of Each, Cost per Gallon of Each Transfer Efficiency (95% is an reasonable assumption)

Sq/Ft Coverage Conversion

Products Volume	Solids	Cost/Gallon	Ratio
Resin	35%	$17.50	9 to
Paste	28%	$21.00	1

Parts Resin x Volume Solids = % Solids Mixed

Parts Paste x Volume Solids = % Solids Mixed

10 Parts % Solids Mixed
Film Thickness

Specific Gravity	1 Mils	1.2 Mils	1.5 Mils	1.8 Mils	2 Mils	2.2 Mils	2.5 Mils	2.8 Mils	3 Mils
1.0	192.3	161.0	128.8	107.3	96.6	87.8	77.2	69.0	64.4
1.1	175.6	146.3	117.0	97.5	87.8	79.8	70.2	62.7	58.5
1.2	161.0	134.1	107.3	89.4	80.5	73.1	64.4	57.5	53.7
1.3	148.6	123.8	99.0	82.5	74.3	67.5	59.4	53.0	49.5
1.4	138.0	115.0	92.0	76.6	69.0	62.7	55.2	59.3	46.0
1.5	128.8	107.3	85.8	71.5	64.4	58.5	51.5	46.0	42.9

1.6	120.8	100.6	80.5	67.1	60.4	54.9	48.3	43.1	40.3
1.7	113.6	94.6	75.7	63.1	56.8	51.6	45.4	40.5	37.9
1.8	107.3	89.4	71.5	59.6	53.6	48.7	42.9	38.3	35.8
1.9	101.7	84.7	67.8	56.5	50.8	46.2	40.6	36.3	33.9
2.0	96.6	80.5	64.4	53.6	48.3	43.9	38.6	34.5	32.2

Specific Gravity	4 Mils	5 Mils
1.0	48.3	38.6
1.1	43.9	35.1
1.2	40.3	32.2
1.3	37.2	29.7
1.4	34.5	27.6
1.5	32.2	25.7
1.6	30.2	24.1
1.7	28.4	22.7
1.8	26.8	21.4
1.9	25.4	20.3
2.0	24.2	19.3

Chart 1: Cost Per Square Foot of High Solids Liquid Spray Coatings

1. % solids x 1604 = theoretical coverage @100% efficiency sq ft/gal, 1 nit thick

2. theoretical coverage/film thickness x transfer efficiency = actual coverage sq ft/gal

3. cost per gal/actual coverage = applied cost sq ft

(*) The number 1604 is the thickness in mils of one gallon of water poured into 1 ft sq box. The number 1923 converts the water to a dry equivalent by dividing 1604 by 8.34 (lb/gal of water)

Application System/Transfer Efficiency Conventional Air Spray/40% HVLP/30-65% Electrostatic/50-70% Disk or Bell/80-90%

Chart II: Transfer Efficiency

Example: Cost per gallon: $21.00

Film Thickness: 1.2 mils

% soldis: 60%

Application: electrostatic spray

1. 192.3/1.6 = 120

2. 962/1.2x.70 = 561

3. 21/561 = $0.0374/sq ft

Chart IV: Applied Cost of Powder Coating

192.3/Specific Gravity = Theoretical Coverage sq ft/lb

Theoretical Coverage/Film Thickness x % Material Utilization - Actual Coverage sq ft/lb

Cost per lb/Actual Coverage = Applied Cost $/sq ft

192.3 is the coverage of 1 lb of powder at a specific gravity of 1.0 at 1 mil film thickness, 100% efficiency

Example: Specific Gravity: 1.6

% Material Utilization: 95%

Film Thickness: 1.5 mils

Cost per lb: $3.00

192.3/1.6 = 120

120/1.5 x .95

80 x .95 = 76

3.0/76 = $0.0394/sq ft

(*) Coverage sq ft/lb: The Theoretical coverage of a given powder can be calculate with the formula shown in the applied cost calculation. Chart V provides a guide to coverage at various thicknesses and specific gravities, all at 100% efficiency

INDUSTRY CODES/NAMES: CHEM   Chemicals, Plastics and Rubber

TEXT:
Find out how these slippery coating can take the hassle out of your stickiest designs.

Think of a part in which friction, poor release characteristic, corrosion, wear, or noise creates a design impasse. Then rethink the same design using a flouropolymer coating. Chances are that a property applied coating will make those problems disappear.

But there is more to using coatings than knowing which one to specify. Designers must follow application guidelines as well as understand the problem at hand to get the most out of coatings.

High-performance fluoropolymer coatings are low-friction, dry-lubricant materials that combine the strengths of two engineering plastics - flouropolymers, with the lowest coefficient of friction of any solid, and organic polymers that resist high temperatures. Together, they produce a coating that can operate successfully at temperature extremes.

At high temperatures, ordinary fluid lubricants char and turn to ash. At low temperatures, the same fluids turn glassy and brittle. Even dry lubricants, such as molybdenum and graphite, can handle only a limited range of lubricating problems at high temperature and pressure.

Flouropolymer coatings work because they combine a slippery lubricant with a polymer binder or matrix. The soft fluoropolymer lubricant, which smears easily, is protected by the wear-resistant binder. Binders also help to hold the lubricating particles in place, and allow them to adhere to a variety of substrates.

Identifying the problem

Applying fluoropolymer coatings involves several considerations. Among the more critical design issues are friction, wear, release properties, corrosion, and noise.

Friction causes heat, wear, and loss of energy in dynamic applications. In severe cases, friction can cause overheating and bearing seizure. Other effects include drive-line vibration and chatter. In these cases, stick-slip motion is usually the cause. This unstable sliding motion occurs at slow speeds, when movement starts and stops as dynamic friction rises above, then falls below, static friction.

Excessive friction harms bearing applications by producing galling, abrasion, and high energy loss. To minimize friction in these cases, consider applying coatings to at least a thickness of 25 microns or 0.001 in. Instrument bearings or other systems in which minimum bearing friction is critical can benefit from a thinner coating (7.5 microns or 0.0003 in.).

Bolted joints also suffer from too much friction, since tightening torque must be used to overcome thread-to-thread and bearing face friction. If a bolt is not properly tensioned in these situations, the joint can become weak in service. Coating the threads reduces the makeup torque by up to 50% and allows tensioning to be done more accurately.

Fluoropolymer coatings overcome friction in the internal components of automobile engines as well, where fluids and dry-film lubricants were

used in the past. High temperatures often melted or degraded these materials. although temperatures often surge over 600[degrees]F inside the engine, new fluoropolymner coating formulas handle the job without breaking down.

Wear is inevitable when two bearing surfaces rub against each other. Mating metal parts have minute peaks called asperities on their surfaces before they meet. Initial contact between them causes a momentary welding of the asperities. As each part continues to move, the welded asperities are ripped off, leaving behind minute pits. No matter how smooth the finish, every bearing and wear surface has this problem. Coatings provide a thin layer of lubrication that prevents asperities on mating surfaces from making contact.

The rate of wear is influenced by the pressure surfaces exert against each other, the velocity at which they move, the length of time they are in contact, and a wear factor constant unique for each combination of surfaces.

The amount of wear and service life is proportional to PV factors (P=pressure, V=velocity) below a certain limit. This limiting PV factor is the point at which increasing P or V converts normal wear into accelerated wear, often leading to catastrophic failure of a bearing.

Several factors influence the limiting PV factor, including temperature. Surfaces moving in contact generate heat, which must be dissipated if the bearing is to survive. Coatings and lubricants reduce the rate of heat generation and help preserve the bearing. All bearing materials, including coatings, must be used below their limiting PV factor to avoid failure.

Release properties or nonstick should not be confused with low friction. Friction results from two surfaces sliding across each other, while release is a surface property that results in the inability of substances to adhere to it. It is a function of surface energy that can be measured by the angle of contact between the surface and a drop of liquid. The larger the contact angle, the greater release property a coating has.

Cookware is often coated to release food materials. But release is equally vital to industrial processes such as thermoforming, rubber molding, automotive and adhesive assemblies, and copying machines. In these applications, buildup of foreign particles is a far greater problem than high bearing loads or corrosion. Examples include carburetor shafts, choke plungers, butterfly spindles, conveyor parts, and instrument probes.

Corrosion can result from single or multiple sources. This complex electrochemical process typically occurs when an oxidizing agent attacks metal. the agents range from salt water and wetting agents to fuels and synthetic lubricants. Joining dissimilar metals causes galvanic corrosion, and vibration between tightly joined parts causes a type of corrosion called fretting.

Fluoropolymer coating offer a simple solution to corrosion problems when applied at 25 micron or 0.001-in. thickness. But to cover microscopic pin holes that may occur in the coating, two thin layers can be applied. Even if corrosives eventually penetrate the coating and attack the substrate, little or no underburrowing occurs, so the parts may still be easily disassembled for refurbishing.

For example, in spite of their appearance, heavily corroded fasteners remain functional if they are coated prior to placing them in service. There are several coating formulas developed specifically for fasteners that are used in the chemical processing and automotive industries.

Noise comes from vibration sources such as high-speed impeller blades, gear teeth, bearings, piston skirts, actuator plungers, and reciprocating detents. Coatings dampen the vibrations by absorbing energy and transmitting the reduced energy to resonant surfaces.

In most cases, noise is effectively dampened by coatings 25 to 40 microns thick. When corrosion is not a consideration, these films may be applied in one coat, although thicker coats absorb more energy. If noise

damping is the primary problem, multiple coats will achieve the best vibration reduction. Avoid excessive thickness, however, to prevent delamination or tearing.

Pretreatment guidelines

Coatings are only as good as the care exercised when they are applied. Following a few guidelines ensures that coatings perform as intended.

Cleaning and pretreatment are important. It is essential to clean every surface to be coated because few coatings adhere to dirty or oily substrates. There are many ways to clean a part, each with advantages and disadvantages. Some techniques go beyond simple cleaning and create surface structures that enable a coating to cling better to the part.

Vapor degreasing use to be the most widely used cleaning technique, but fell into disfavor because of regulatory restrictions on solvents. Where permitted, degreasing remains an excellent method for removing a wide variety of foreign material, from fingerprints to machine oils. It is an economical technique for cleaning small batches of parts. Avoid using it on parts that may be attacked by the solvent, such as plastics, composites, or metal parts with organic inserts.

Grit blasting or tumble blasting with aluminum oxide or other abrasive particles is another common way to clean parts. This method is best for removing rust, scale, corrosion, old coatings, and any contaminant that must be attacked physically to be removed. It is not the most effective way to remove oily or fluid contaminants, however. When parts are particularly oily, alkaline cleaning or prebaking before blasting will improve effectiveness of the blast.

In addition to cleaning, grit blasting roughens the surface and enhances mechanical adhesion by increasing the surface area to which a coating can cling. Most metal parts require a grit medium from 60 to 120 mesh. Steel grit is generally avoided because minute particles left behind can become starting points for oxidation.

Tumble blasting is another variation in which small parts are placed into a rotating cylinder where an abrasive medium is blown against the surfaces.

Shot blasting is similar to grit blasting, but typically uses metal shot as the blast medium. This process imparts residual compressive stress on the part surface. For parts in fatigue or fretting applications with cyclic loads, this lengthens their lives.

Alkaline washing involves cleaning parts with neutral, moderate, or high-pH cleaners. This is preferred for high-volume parts and is generally as effective as vapor degreasing. Materials such as aluminum, magnesium, and other active metals that have the potential to be adversely affected by the chemistry of alkaline washing should be carefully evaluated prior to using high pH cleaners.

Acid or alkaline etching, a variation, cleans and roughens the surface of aluminum parts. But it is reserved for high volumes because it requires considerable equipment.

Secondary surface preparations include pickling, phosphating, and anodizing. Pickling removes rust and scale from ferrous parts after cleaning, but should not be used on highly loaded parts because it can cause hydrogen embrittlement. Phosphating, also performed on steel parts after cleaning, promotes better adhesion and increases resistance to corrosion and chemicals. Conversion coating, or anodizing, serves a similar function for aluminum, but produces a harder surface than phosphating.

Pretreatment combinations are required for the best overall coating adhesion and corrosion protection. Industry practice for common substrates includes:

* Carbon steel - alkaline wash/grit blast/phosphate
* Aluminum - alkaline. wash/etch or grit blast
* Stainless steel - heat oxidize/grit blast/etch
* Chrome and nickel plate - alkaline wash/prebake/grit blast

Applying solutions

Preheating parts prior to coating removes condensation that can form on cool parts in humid atmospheres. It is also useful for parts with large mass, in which oven dwell times to bring them up to temperature would not be economical. Preheat part parts only to a maximum of 125 [degrees] F. Higher temperatures will cause solvents in the coating to volatilize too quickly, causing defects in the finish.

The next step in coating parts is to choose an application method. Choices depend on part shape, number of parts, required transfer efficiency, application rate, and type of carrier used in the formula

Spraying is by far the most versatile and widely used technique. Conventional spraying covers small numbers of parts where considerable manual work is required. HVLP, or High Volume, Low Pressure, is a variation that reduces air pressure and increases liquid volume. This efficiency also reduces the number of volatile organic compounds (VOCs) released.

Airless spraying uses hydraulic pressure to move and atomize liquid instead of air. Pressure pot method, where the coating is under positive pressure, exerts more pressure than a conventional system for larger production runs. Electrostatic spraying, recommended for high production runs or complex shapes, coats rods, wires, outdoor furniture, and other parts that require a 360 [degrees] coating.

Bulk techniques are the most economical ways to apply coatings to small and intricate parts such as fasteners, clips, or other irregularly shaped pieces. Transfer efficiency is high - as much as 95% of the coating is applied to parts. Bulk techniques operate in two basic ways - dip/spin and barrel/tumble.

In dip/spin coating, a basket filled with parts is immersed in a reservoir half filled with coating. The basket is then raised out of the coating and spins to carry away excess fluid. Because parts are in contact with each other, two passes are needed to ensure total coverage. For lightweight or flat parts like washers or small O-rings, parts are tumbled and sprayed while hot air passes over them. This eliminates the problem of nesting common with these types of parts.

High-volume techniques include coil and curtain coating. High-speed rollers in a coil coating system apply precise film thicknesses to a wide continuous sheet of metal. This process is often used for cookware, bakeware, and small appliances. Curtain coaters pass parts through a falling curtain of coating fluid, but it is difficult to control coating thickness and placement.

Curing

After coatings are applied, they must be flashed and cured. Flashing is done at elevated temperature, but lower than the cure temperature, to vaporize the coating's carrier. Then parts are cured so that coating particles can link into a tough, continuous film.

The curing process depends on a time/temperature relationship: the higher the temperature, the shorter the curing time required. Altering the time/temperature relationship can affect the amount of cure.

Convection systems use heated air to cure coatings. They are the most common type of curing system. Sophisticated production ovens that use conveyors to move parts usually have at least three heat zones within them: a warmup zone, a bake zone, and a heat extraction zone.

Infrared systems are not used as often because the heating elements tends to become glazed by the fumes given off during the process. As they become covered, the elements radiate less energy and become ineffective. But these systems are very effective for flat or shallow parts.

Curing schedules vary for different formulas, depending on the resin binder used and other factors. Most coatings, however, permit wide latitude in cure temperatures so the cure can be compatible with the part. For instance, you may limit the cure temperature of a die cast part to 350 [degrees] F or of a formed aluminum part to 450 [degrees] F.

THE PROBLEM

WITH VOC'S

Volatile Organic Compounds are those ingredients in a paint or coating defined as photochemically reactive by the U.S. Environmental Protection Agency. They escape into the atmosphere during drying or curing. With few exceptions, all organic solvents are classified as VOCs.

The coatings described in this article come under the "extreme performance" industry classification. This includes coatings designed for constant exposure to weather, temperatures above 203 [degrees] F, detergents, abrasive or scouring agents, solvents, corrosive atmospheres, or similar environmental conditions. Extreme performance coatings have the following limits on VOCs:

* Pigmented coatings, normal use 3.0 lb/gal
* Pigmented coatings, extreme performance.3.5 lb/gal
* Clear coatings 4.3 lb/gal

Note: Some states measure VOC limits in metric terms (g/l). To make the conversion, multiply lb/gal by 120.

To calculate VOC content,

VOCs = Density (lb/gal) x (1 - % solids by weight).

For waterborne coatings, VOCs are calculated without water and other exempt compounds. The formula becomes:

VOCs = [Density (lb/gal) x (1 - % solids by weight - % water by weight)]//(1 - % water by volume.)

In most areas, regulations permit averaging the VOCs emitted during a 24-hour period. The means if you use a low-VOC material, you can also use the same amount of a high-VOC material providing the total amount produced during that period does not exceed local limits.

HOW MUCH DOES A
COATING COST?

The answer to that question goes beyond the cost of the material alone. Materials may be only a small part of the total coating cost because of the labor needed to mask, rack, coat or multicoat, and package.

Judging price by the cost of a gallon, liter, or kilo usually leads to cost overruns. In fact, low-cost coating materials often come with a higher price per unit area of coverage. The best way to compare the cost of a coating is to **determine** the **cost** of covering a given area at a specific **film** **thickness** , normally 25 microns or 0.001 in.

What gives a coating its coverage? The answer is the amount of volume solids it contains. But few coatings contain the same amount of solids. Furthermore, there are a variety of solid materials, each having a different weight. When the coating is cured and the liquids are driven off, only the solids remain. Thus, solid ingredients that are denser than others don't cover as much area by weight. Coverage depends on the area and thickness of the coating. This is volume, not weight. Weight solids are different, so don't confuse the two.

Changes mandated by various VOC regulations have generally increased the cost per gallon by increasing the amount of solids in a coating. The good news is that the coatings will now cover greater unit areas, offsetting the apparent increase in cost.

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SPECIAL FEATURES: illustration; photograph; graph
INDUSTRY CODES/NAMES: METL Metals, Metalworking and Machinery; ELEC
    Electronics; ENG Engineering and Manufacturing
DESCRIPTORS: ^ Fluoropolymers--Usage; Solid lubricants--Usage; Surface
  preparation--Technique; Plastic coating--Technique
SIC CODES: 2869 Industrial organic chemicals, not elsewhere classified;
  2851 Paints and allied products
FILE SEGMENT: TI File 148
?

FLUORESCENCE EMISSION RATIO IMAGING THERMOGRAPHY FOR USE IN HEAT TRANSFER ANALYSIS

THERMOGRAPHIE PAR IMAGE-RATIO A EMISSION FLUORESCENTE POUVANT ETRE UTILISEE DANS UNE ANALYSE PAR TRANSFERT DE CHALEUR

Patent and Priority Information (Country, Number, Date):
  Patent: WO 200323343 A1 20030320 (WO 0323343)
  Application: WO 2002US22622 20020717 (PCT/WO US0222622)

English Abstract
  The present invention provides a fluorescent imaging thermographic method
  and system for use in surface temperature measurements, which are
  reproducible over time. The invention provides a temperature-sensitive
  fluorescent probe (23) comprising a rare earth compound in an ultraviolet
  and fluorescence transparent medium (25) in order for the intensity of
  the fluorescence to vary as the temperature varies. The probe comprises
  Eu (1,1,1,5,5,5-hexafluoroacetylacetone)"sub"3 for measuring temperatures
  greater than 24 degreesC, and Tb
  (1,1,1,5,5,5-hexafluoroacetylacetone)"sub"3 for measuring temperatures
  less than 24 degreesC. The probe is applied as a layer to a surface (22)
  and exposed to fluorescence-inducing energy (10), then the emitted
  fluorescence is measured (12) and a ratio-imaging algorithm determines
  the temperature at each location on the surface.

French Abstract
  L'invention concerne un procede et un systeme thermographiques d'imagerie
  par fluorescence utilisables dans des mesures de temperature en surface,
  et pouvant etre reproduits au fil du temps. L'invention concerne une
  sonde fluorescente thermosensible (23) contenant un compose de terres
  rares dans un milieu ultraviolet et transparent par fluorescence (25), si
  bien que l'intensite de la fluorescence varie en meme temps que la
  temperature. La sonde comprend: Eu
  (1,1,1,5,5,5-hexafluoroacetylacetone)"sub"3 pour mesurer des temperatures
  superieures a 24 degreesC, et Tb
  (1,1,1,5,5,5-hexafluoroacetylacetone)"sub"3 pour mesurer des temperatures
  inferieures a 24 degreesC. La sonde est appliquee sous forme de couche
  sur une surface (22) et exposee a une energie generatrice de fluorescence
  (10), puis la fluorescence emise est mesuree (12) et un algorithme
  d'image-ratio determine la temperature a chaque emplacement sur la
  surface.

Fulltext Availability:
  Detailed Description
Detailed Description
... was filtered and dried for 24 hours at
  700 C,
  Film application methods are primarily
   determined by the costs , film thickness , appearance
  requirements, and structure of the object to be coated.

  Several commonly used methods such...

Substrate with zinc oxide layer, method for producing zinc oxide layer, photovoltaic device, and method for producing photovoltaic device

Substrat mit Zinkoxidschicht und Herstellungsverfahren der Zinkoxidschicht, photovoltaisches Bauelement und dessen Herstellungsverfahren
Substrat comportant une couche d'oxyde de zinc et son procede de fabrication, dispositif photovoltaique et son procede de fabrication
PATENT (CC, No, Kind, Date):   EP 932207 A2 990728 (Basic)
APPLICATION (CC, No, Date):   EP 99101228 990122;
PRIORITY (CC, No, Date): JP 2518098 980123; JP 2518198 980123

ABSTRACT EP 932207 A2
    Provided are a substrate with a zinc oxide layer, in which at least a
zinc oxide layer is provided on a support substrate, wherein the zinc
oxide layer comprises a zinc oxide layer having the c axis perpendicular
to the support substrate and a zinc oxide layer having the c axis
slantindicular to the support substrate in the order from the side of the
support substrate; and a photovoltaic device in which a semiconductor
layer is formed on the substrate with the zinc oxide layer. Thus provided
is the inexpensive photovoltaic device with excellent reflective
performance and optical confinement effect and with high photoelectric
conversion efficiency.

...SPECIFICATION the thick zinc oxide layer thereon by the
electrodeposition method. Conceptually, it is possible to **determine
cost** distribution in proportion to the thickness. For example, if the
thickness of the sputtered **film** is 10 or less % of the total
thickness, the cost impact due to the sputtering...
?